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University of California
College of Agriculture
Agricultural Experiment Station
Berkeley, California

SEASONAL LABOR NEEDS FOR CALIFORNIA CROPS

SACRAMENTO-SAN JOAQUIN DELTA

Progress Report No. 59

by

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Preliminary -- Subject to Correction

January, 1937

Contribution from the
Giannini Foundation of Agricultural Economics
Mimeographed Report No. 53

(Farm Labor Survey -- December, 1936)

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Seasonal Labor Needs for California Crops

Sacramento-San Joaquin Delta

Scope of Presentation.-- The following considerations govern the presentation of this progress report:

1. The data are confined to the area indicated above.

2. The data are confined solely to crops, livestock needs being ignored.

3. The findings apply only to occasional or seasonal labor requirements as distinguished from labor contributed by farm operators and by workers employed on a year-round or regular basis of employment.

4. Attention is concentrated upon workers required for hand tasks -- planting, thinning, weeding, hoeing, and harvesting -- without including teamsters, tractor drivers, irrigators, and shed packers of vegetables or fruits.

5. The presentation includes the so-called migratory, transient, or roving workers which comprise an important source of help needed in connection with certain tasks and at "peak" times which seasonally arise in connection with many field, truck, and fruit crops commercially produced in California.

6. This report is confined to California's need for seasonal agricultural workers because of the more pressing problems liable to arise in connection therewith. A later study is planned which will deal with other kinds of labor involved in the production of California's many crops.

Brief Description of the Area.-- The area known as the Sacramento-San Joaquin Delta, or "The Delta", is roughly in the shape of a triangle bounded by lines running between Antioch, Tracy, and Sacramento. Here are found soils and topographic features peculiar to this region and affected by conditions not found in the usual upland regions. These delta swamp lands have been built up gradually from deposits of silt and decayed vegetation. When the Sacramento and San Joaquin Rivers reach this low-lying area, they spread out over the Delta, forming many islands separated by water channels, and finally unite and emerge into the upper reaches of the San Francisco Bay through one channel.

The soils of the entire region vary from the rich sedimentary silt and clay loams of the upper Sacramento delta to the extensive peats of the San Joaquin delta. While most of the delta lies in Sacramento and San Joaquin counties, parts of it extend into Contra Costa, Yolo, Solano, and Sonoma counties. A division is made into the Sacramento and San Joaquin deltas on the basis of soil types, the former containing mainly silts, and the latter, peat soils. No exact line can be drawn to divide these two areas, however, since in the formation there was laid down a large area of a mixture of both peat and silt soils. The San Joaquin delta has approximately 220,660 acres of farming land, and the Sacramento delta has approximately 162,910 acres available for farming. The area is devoted mainly to field and truck crops with some plantings of deciduous fruits.

Crops, Acreages, and Production.-- The basis used in calculating occasional or seasonal need for labor, other than that furnished by farm operators and regularly employed workers, appears as table 1.

TABLE I

Basis for Calculating Seasonal Labor Requirements
Delta Region

Crops	Acreage	Production
Field crops:		
Alfalfa	25,000*	Average 6 tons per acre -- 150,000 tons
Beans	16,000*	Average 10 to 15 sacks per acre
Corn	30,000 or more	Average 1 ton per acre
Grain -- barley, oats, wheat	75,000 or more	--
Grain sorghums (milo etc.)	6,000 (practically no data)	Average 2,500 pounds per acre
Mints (spearmint and peppermint)	420	--
Onions, intermediate crop	1,000†	Average 250 cwt. per acre -- 250,000 cwt.
Onions, late crop	2,300†	Average 175 cwt. per acre -- 402,500 cwt.
Potatoes (Irish)	12,000	Average 155 cwt. per acre -- 1,860,000 cwt.
Sugar beets	36,518	Average 17 tons per acre -- 620,800 tons
Seed crops:		
Beet seed	1,500	--
Carrot seed	2,000	--
Lettuce seed	1,500	--
Onion seed	700	--
Other ‡	250	--
Sunflowers	2,000	2,000,000 pounds
Vegetable crops:		
Asparagus	60,325 §	
1935 planting	8,028	--
Celery (Fall)	7,150 ¶	1,128,000 half crates ‖
Cucumbers	506	--
Peas	1,250 (very little data)	Average 150 hampers per acre -- 187,500 hampers
Spinach	1,750	7,875 tons
Tomatoes	6,000 (very little data)	Average 5 tons per acre -- 30,000 tons
Fruit crops:		
Pears	4,500	Average 5 tons per acre -- 22,500 tons

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TABLE I

Data for Calculating Seasonal Labor Requirements
Delta Section

Crops	Acreage	Production
Field crops:		
Alfalfa	25,000*	Average 6 tons per acre -- 150,000 tons
Beans	16,000*	Average 10 to 15 sacks per acre
Corn	30,000 or more	Average 1 ton per acre
Grain -- barley, oats, wheat	75,000 or more	--
Grain sorghums (milo etc.)	6,000 (practically no data)	Average 2,500 pounds per acre
Mints (spearmint and peppermint)	420	--
Onions, intermediate crop	1,000†	Average 250 cwt. per acre -- 250,000 cwt.
Onions, late crop	2,300†	Average 175 cwt. per acre -- 402,500 cwt.
Potatoes (Irish)	12,000	Average 156 cwt. per acre -- 1,860,000 cwt.
Sugar beets	35,518	Average 17 tons per acre -- 820,800 tons
Seed crops:		
Beet seed	1,800	--
Carrot seed	2,000	--
Lettuce seed	1,500	--
Onion seed	700	--
Other ¶	280	--
Sunflowers	2,000	2,000,000 pounds
Vegetable crops:		
Asparagus	80,328‖	
1938 planting	8,028	--
Celery (Soil)	7,150 ¶	1,188,000 half crates ‖
Cucumbers	806	--
Peas	1,250 (very little data)	Average 180 hampers per acre -- 187,500 hampers
Spinach	1,750	7,875 tons
Tomatoes	6,000 (very little data)	Average 5 tons per acre -- 30,000 tons
Fruit crops:		
Pears	4,500	Average 5 tons per acre -- 22,500 tons

* Estimate based on Sacramento-San Joaquin Water Supervisors Report for 1932.

† Estimate from California Cooperative Crop Reporting Service.

‡ Includes endive, parsnip, sugar beet, flower seed, etc. Omitted from table 3 because scattered and inconsequential.

§ Includes 1411 acres in Oakley-Knightsen District, but excludes 932 acres in Sutter Basin.

¶ Excludes 250 acres in southern San Joaquin County not in the delta.

|| Celery production estimated from shipment record -- 2,992 cars of 377 half crates each -- crop of previous season was 1,440,000 half crates from about 6,150 acres.

Operations Requiring Seasonal Labor and Times of Need.-- Farm operations requiring the use of seasonal labor for the various crops raised in the Sacramento and San Joaquin deltas are indicated in table 2. This tabulation does not include the employing of shed workers needed to wash, pack, and prepare various commodities for shipping and marketing.

TABLE 2

Operations Requiring Use of Seasonal Labor and Times of Needs by Crops
Sacramento-San Joaquin Delta

Crop	Operation	Time of need by months	Per cent of work done by seasonal help	Output per man-day
Field crops:				
Alfalfa	Mowing -- 50 per cent by tractor	April 10 to October 10 (5 cuttings)	50	20 acres with tractor
	50 per cent by horses			8 acres with horses
	Raking -- 50 per cent by power	(5/6 of acreage each month)	50	40 acres with tractor
	50 per cent by horses	April to September, inclusive		20 acres with horses
	Shocking		50	40 acres
	Trimming		66	10 acres
	Stacking -- 50 per cent of crop	April 15-30, October 1-15 -- 7-1/2 per cent of tonnage each month	66	7.5 tons
	Baling -- all of crop	May-August, June-September, July -- 17 per cent of tonnage each month	50	3.5 tons
Beans	Hoeing -- first	August 1-20 -- all acreage	100	1 acre
	second	August 20-31 -- all acreage	100	2 acres
	Piling, windrowing	September 20-30 -- 25 per cent of crop; October 1-31 -- 75 per cent of crop	100	1.66 acres
	Threshing	October 1-31 -- all of crop	40	80 cwt. or about 4 acres
Corn (field)	Hoeing	Not generally done -- inconsequential		
	Picking, husking and hauling to cribs	October 1-31 -- 30 per cent of crop; November 1-30 -- 40 per cent of crop; December 1-31 -- 30 per cent of crop	100	0.75 acre
Grain	Harvesting	June -- 50 per cent of acreage; July -- 50 per cent of acreage	75	4 acres
Grain sorghums	Hoeing	June -- all acreage	100	1 acre
	Harvesting (with combine)	October -- all of crop	50	2.5 acres

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Crop	Operation	Time of need by months	Per cent of work done by seasonal help	Output per man-day

Table 2 continued.

Crop	Operation	Time of need by months	Per cent of work done by seasonal help	Output per man-day
Mints -- spearmint peppermint	Weeding -- 3 times	February -- 25 per cent of acreage March -- 50 per cent of acreage April -- all acreage May -- all acreage June -- 25 per cent of acreage	60	one-third acre
Onions -- intermediate crop	Transplanting	November 1-30 -- 50 per cent of acreage December 1-31 -- 50 per cent of acreage	100	one-eighth acre
	Weeding -- 2 to 4 times	February -- 1 man-day per acre March -- 2 man-days per acre April -- 2 man-days per acre May -- 1 man-day per acre	100	varies greatly estimated at 6 man-days per acre total
	Harvesting -- pulling, topping, and sacking	June -- all of crop	100	30 cwt.
Onions -- late crop	Weeding	March -- 2 man-days per acre April -- 4 man-days per acre May -- 4 man-days per acre	100	varies greatly estimated at 10 man-days per acre
	Harvesting -- pulling, topping, and sacking	July 20-31 -- 15 per cent of crop August 1-31 -- 60 per cent of crop September 1-15 -- 25 per cent of crop	100	30 cwt. 30 cwt. 30 cwt.
Potatoes	Cutting seed 1200 pounds per acre	March -- small amount, inconsequential April -- 60 per cent of job May -- 25 per cent of job June -- 10 per cent of job July -- small amount, inconsequential	100	1000 pounds

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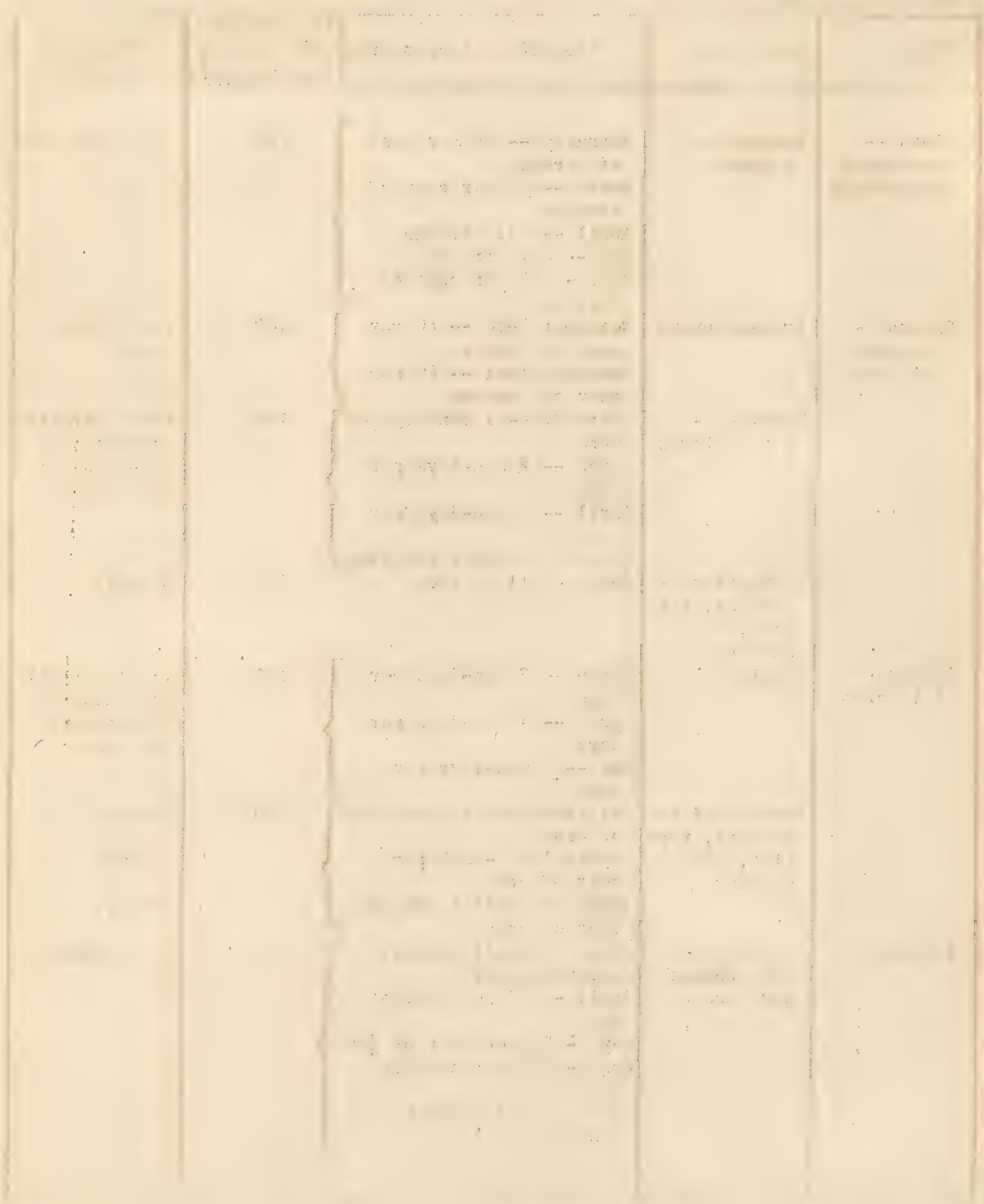

Crop	Operation	Time of need by months	Per cent of work done by seasonal help	Output per man-day
Potatoes (continued)	Planting -- including fertilizing	March -- small amount (inconsequential) April -- 60 per cent of acreage May -- 25 per cent of acreage June -- 10 per cent of acreage July -- small amount (inconsequential)	50	1 acre
	Cultivating -- 4 times	May -- 75 per cent of acreage June -- 100 per cent of acreage July -- 100 per cent of acreage August -- 75 per cent of acreage September -- 50 per cent of acreage	100	5 acres
	Hoeing	May -- 1-1/2 man-days per acre June -- 1-1/2 man-days per acre	100	3 man-days per acre total
	Harvesting	July -- 3 per cent of crop August -- 19 per cent of crop September -- 15 per cent of crop October -- 17 per cent of crop November -- 15 per cent of crop December -- 11 per cent of crop January -- 10 per cent of crop February -- 5 per cent of crop March -- 5 per cent of crop	100	40 cwt.
Sugar Beets	Thinning	February -- 2 per cent of acreage March -- 20 per cent of acreage April -- 57 per cent of acreage May -- 16 per cent of acreage June -- 5 per cent of acreage	100	0.5 acre

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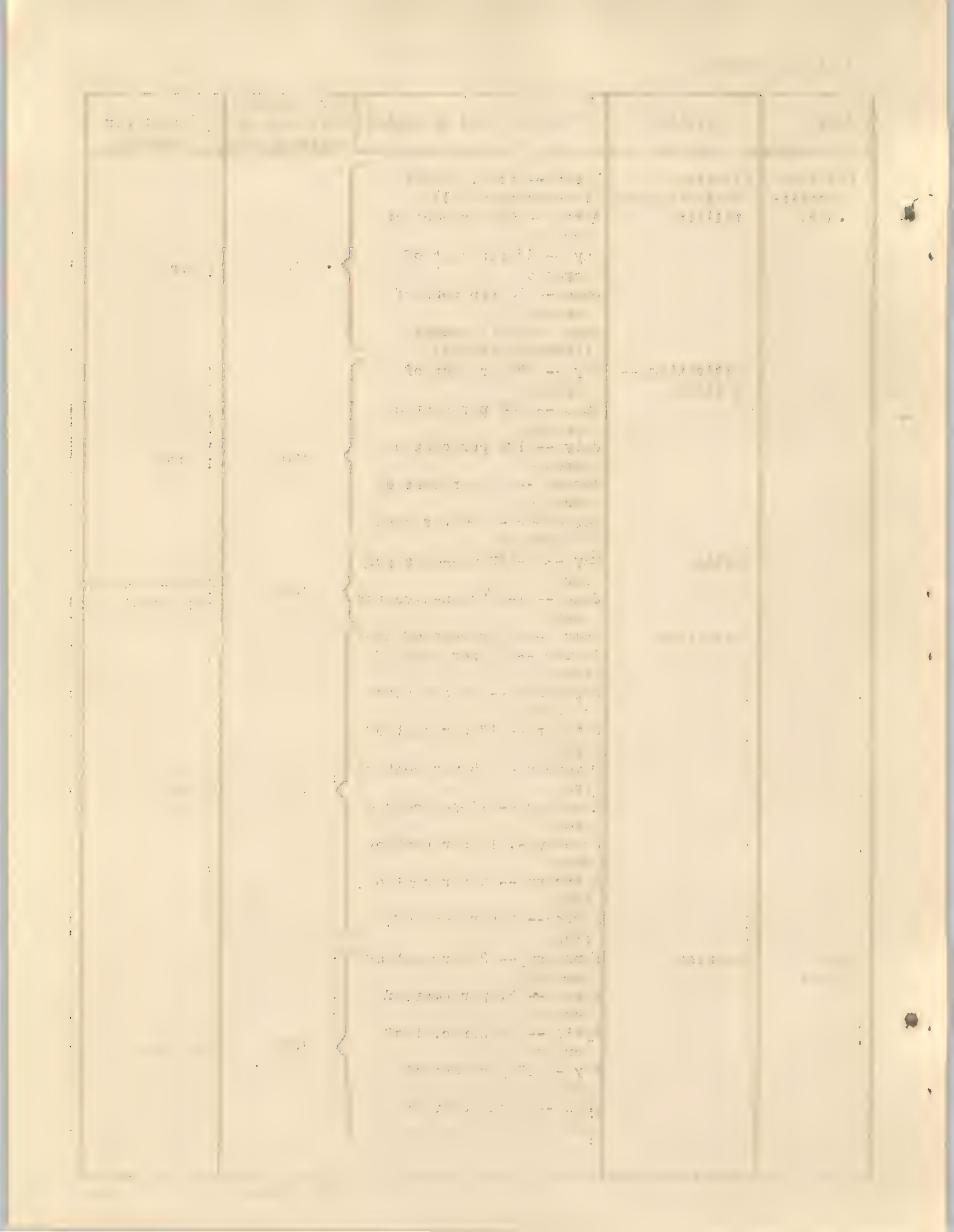

Table 2 continued.

Crop	Operation	Time of need by months	Per cent of work done by seasonal help	Output per man-day
Sugar Beets (continued)	Hoeing -- first time	March -- 2 per cent of acreage April -- 20 per cent of acreage May -- 57 per cent of acreage June -- 16 per cent of acreage July -- 5 per cent of acreage		1.5 acres
	second time	May -- 25 per cent of acreage June -- 70 per cent of acreage July -- 5 per cent of acreage	100	2.0 acres
	third time	June -- 25 per cent of acreage July -- 50 per cent of acreage August -- 25 per cent of acreage*		2.5 acres
	Topping and loading	July -- 12 per cent of tonnage August -- 28 per cent of tonnage September -- 27 per cent of tonnage October -- 22 per cent of tonnage November -- 6 per cent of tonnage December -- 5 per cent of tonnage	100	6.0 tons
Sunflowers	Thinning and hoeing (once)	April 15-30 -- one-third of acreage May 1-31 -- two-thirds of acreage	100	1 acre
	Cutting off heads by hand	August 15-31 -- 20 per cent of acreage September 1-30 -- 40 per cent of acreage October 1-31 -- 40 per cent of acreage	100	1.5 acres
Seed crops: Beet -- for seed	Planting by hand 36 inches by 36 inches	December 15-31 -- 25 per cent of acreage January 1-31 -- 75 per cent of acreage	100	0.75 acre

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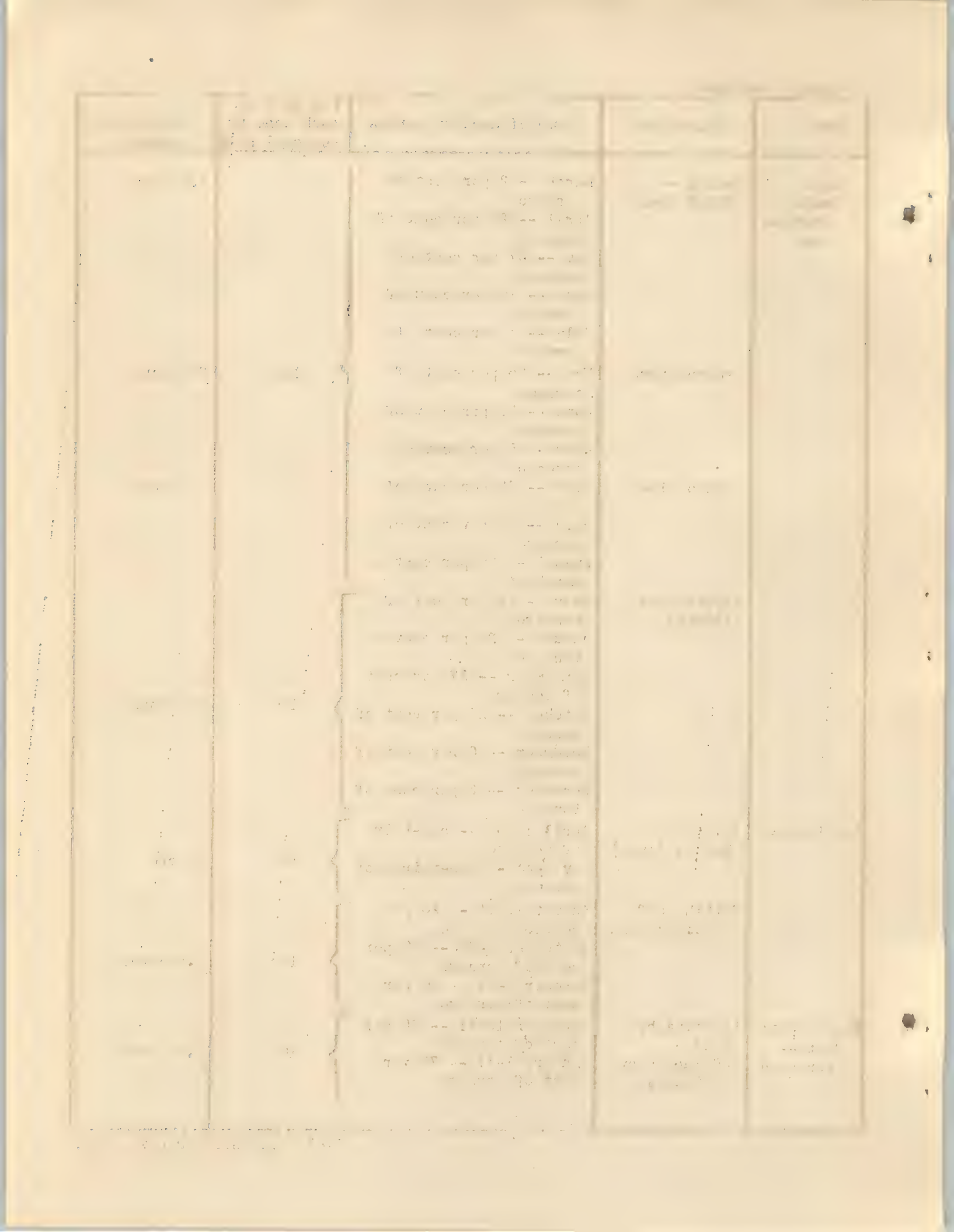

Table 2 continued.

Crop	Operation	Time of need by months	Per cent of work done by seasonal help	Output per man-day
Beet -- for seed (continued)	Hoeing -- twice	March 1-31 -- all acreage April 15-30 -- 50 per cent of acreage May 1-15 -- 50 per cent of acreage	100	0.75 acre 1.5 acres
	Clipping off top of seed stalks with knife	May -- all acreage	100	5 acres
	Cutting off branches and laying in piles	August 1-31 -- all acreage	100	0.5 acre
	Threshing from stock -- with stationary machine	August 15-31 -- 80 per cent of crop September 1-7 -- 20 per cent of crop	80	1.8 acres -- or 22 sacks of 80 pounds
Seed: Carrot seed	Transplanting to field -- 3 feet by 3 feet	December -- one-third of acreage January -- one-third of acreage February -- one-third of acreage	100	0.5 acres -- 9 hours
	Hoeing -- twice	March 15-31 -- 40 per cent of acreage April 1-30 -- 80 per cent of acreage May 1-31 -- 80 per cent of acreage	100	0.75 acre
	Harvest -- cutting by hand and piling (Dry on sheets)	August 20-31 -- 50 per cent of acreage September 1-20 -- 50 per cent of acreage	100	0.4 acre
	Threshing, screening and sacking	September -- all of crop	50	0.33 acre
Lettuce seed	Thinning and hoeing	March 15-31 -- 25 per cent of acreage April 1-30 -- 50 per cent of acreage May 1-15 -- 25 per cent of acreage	100	0.5 acre
	Hoeing	May 1-31 -- two-thirds of acreage June 1-15 -- one-third of acreage	100	0.5 acre

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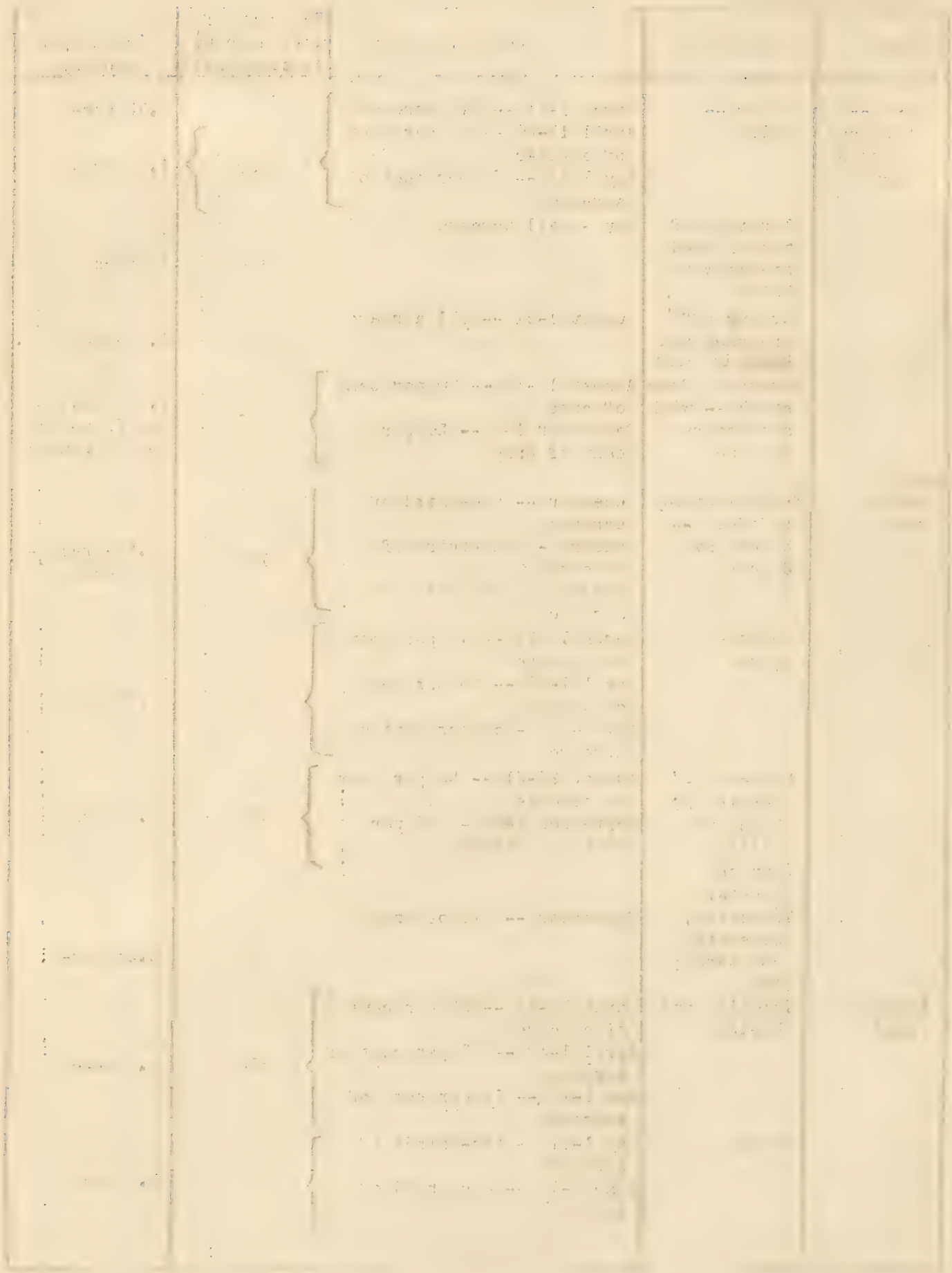

Table 2 continued.

Crop	Operation	Time of need by months	Per cent of work done by seasonal help	Output per man-day
Lettuce seed (continued)	Cutting and throwing on wagons	July -- 10 per cent of acreage August -- 80 per cent of acreage September -- 10 per cent of acreage	100	0.33 acre
	Threshing (by rolling) screening and sacking	August -- 80 per cent of acreage September -- 20 per cent of acreage	50	0.5 acre -- 10 hours
Onion seed	Planting	December 1-31 -- one-third of acreage January 1-31 -- one-third of acreage February 1-28 -- one-third of acreage	100	0.20 acre
	Hoeing -- twice	March 1-31 -- one-third of job April 1-30 -- one-third of job May 1-31 -- one-third of job	100	0.42 acre 24 hours per acre each time
	Picking (hand cutting)	July 20-31 -- two-thirds of acreage August 1-5 -- one-third of acreage	100	varies greatly with yield 0.17 acre
	Threshing by rolling, screening and winnowing	August -- all acreage	50	0.4 acre
Vegetable crops: Asparagus	Hoeing (new acreage) first time	April -- 50 per cent of new planting May -- 50 per cent of new planting	100	1 acre
	second time	July -- 50 per cent of new planting August -- 50 per cent of new planting	100	1.5 acres
	Cutting	March 1-31 April 1-30 May 1-31 June 1-30	100	varies -- average 450 pounds (requires 1 man continuously on each 10 acres)

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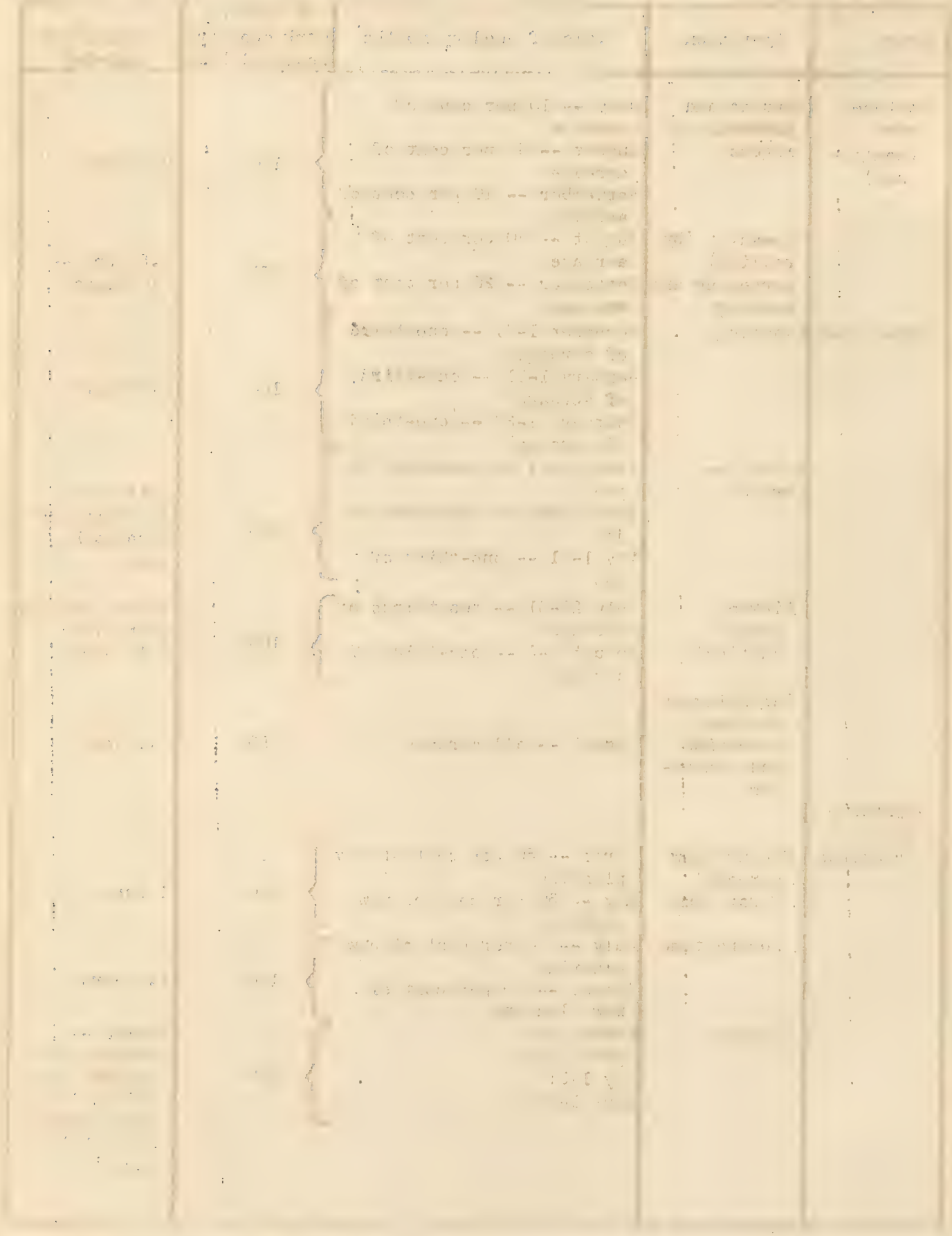

Table 2 continued.

Crop	Operation	Time of need by months	Per cent of work done by seasonal help	Output per man-day
Asparagus (continued)	Washing and trimming -- putting in lugs for cannery	April 10-30 May 1-31 June 1-30	100	1 man to each 50 acres (or 1 ton per day)
	Packing for shipment not classed as "field" labor -- hence omitted.			
Celery (Fall)	Weeding seed bed	April 15-30 -- 25 per cent of job May 1-31 -- 50 per cent of job June 1-15 -- 25 per cent of job	100	varies greatly but average 30 man-hours per acre of field (range 8 to 80 man-hours)
	Pulling plants	June 15-30 -- 30 per cent of acreage July 1-31 -- 60 per cent of acreage August 1-5 -- 10 per cent of acreage	100	one-fourth acre
	Planting -- by machine	June 15-30 -- 30 per cent of acreage July 1-31 -- 60 per cent of acreage August 1-5 -- 10 per cent of acreage	100	one-half acre
	"Scratching" (Weeding) 3 to 5 times	July 15-31 -- 2-1/2 days per acre August 1-31 -- 2-1/2 days per acre September 1-30 -- 1 day per acre October 1-15 -- 1 day per acre	100	total of 7 man days per acre (varies greatly)
	Cultivating (8 times)	July 15 -- 2 times on all acres August 1-31 -- 4 times on all acres September 1-30 -- 4 times on all acres October 1-15 -- 2 times on all acres	50	6 acres
	Harvesting	October 15-31 -- 5 per cent of crop November 1-30 -- 40 per cent of crop December 1-31 -- 45 per cent of crop January 1-10 -- 8 per cent of crop (Remainder scattering and inconsequential)	100	18.8 half crates per man-day

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Table 2 continued.

Crop	Operation	Time of need by months	Per cent of work done by seasonal help	Output per man-day
Cucumbers	Hoeing -- 3 times	May -- 50 per cent of job June -- 50 per cent of job	100	total of 20 hours per acre (varies greatly)
	Picking	July 15-31 -- all acreage August 1-31 -- all acreage September 1-15 -- all acreage	100	1 man for each 2 acres continuously
Peas -- market	Hoeing	February -- 50 per cent of job March -- 50 per cent of job	100	varies -- average requirement is about 14 man-hours per acre
	Picking -- 3 pickings	April 15-30 -- 15 per cent of crop May 1-31 -- 85 per cent of crop	100	12 hampers
Tomatoes	Transplanting to beds	February 15-28 -- 50 per cent of job March 1-15 -- 50 per cent of job	80	5,000 plants
	Planting by hand -- two-thirds of acreage	April 15-30 -- 50 per cent of job May 1-15 -- 50 per cent of job	100	0.5 acre
	Replanting (misses)	May -- 50 per cent of job June -- 50 per cent of job	100	2 hours per acre
	Hoeing -- first second	May 10-31 -- all acres June 1-30 -- all acres	100	1 acre
	Picking	August 15-31 -- 15 per cent of crop September 1-30 -- 45 per cent of crop October 1-31 -- 40 per cent of crop (Picking extends until frosts occur, which is sometimes after November 10)	100	1 ton on Stone 0.66 ton on San Marzano average 0.75 ton
Fruit crops: Pears	Pruning	November -- one-third of acreage December -- one-third of acreage January -- one-third of acreage	100	0.25 acre

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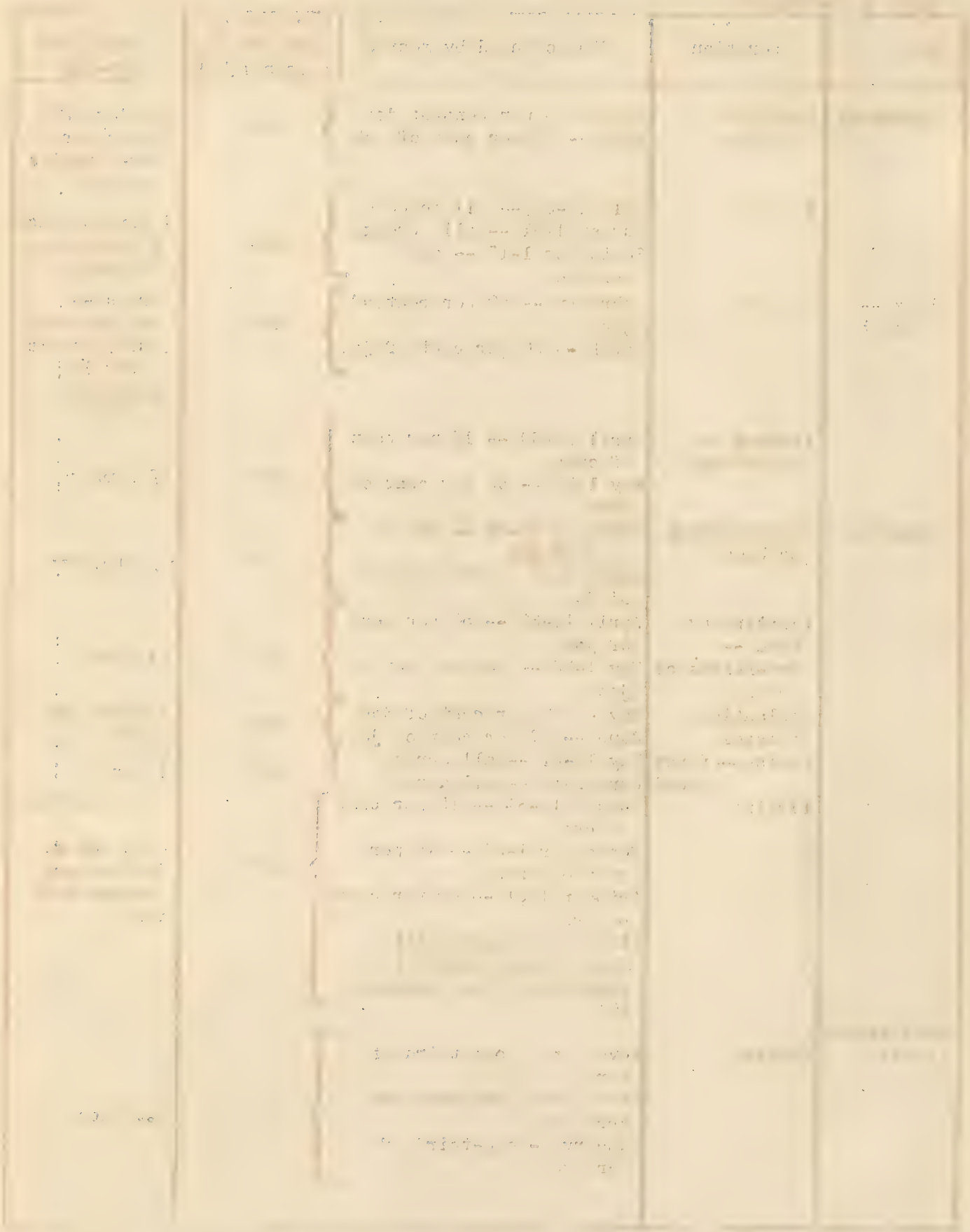
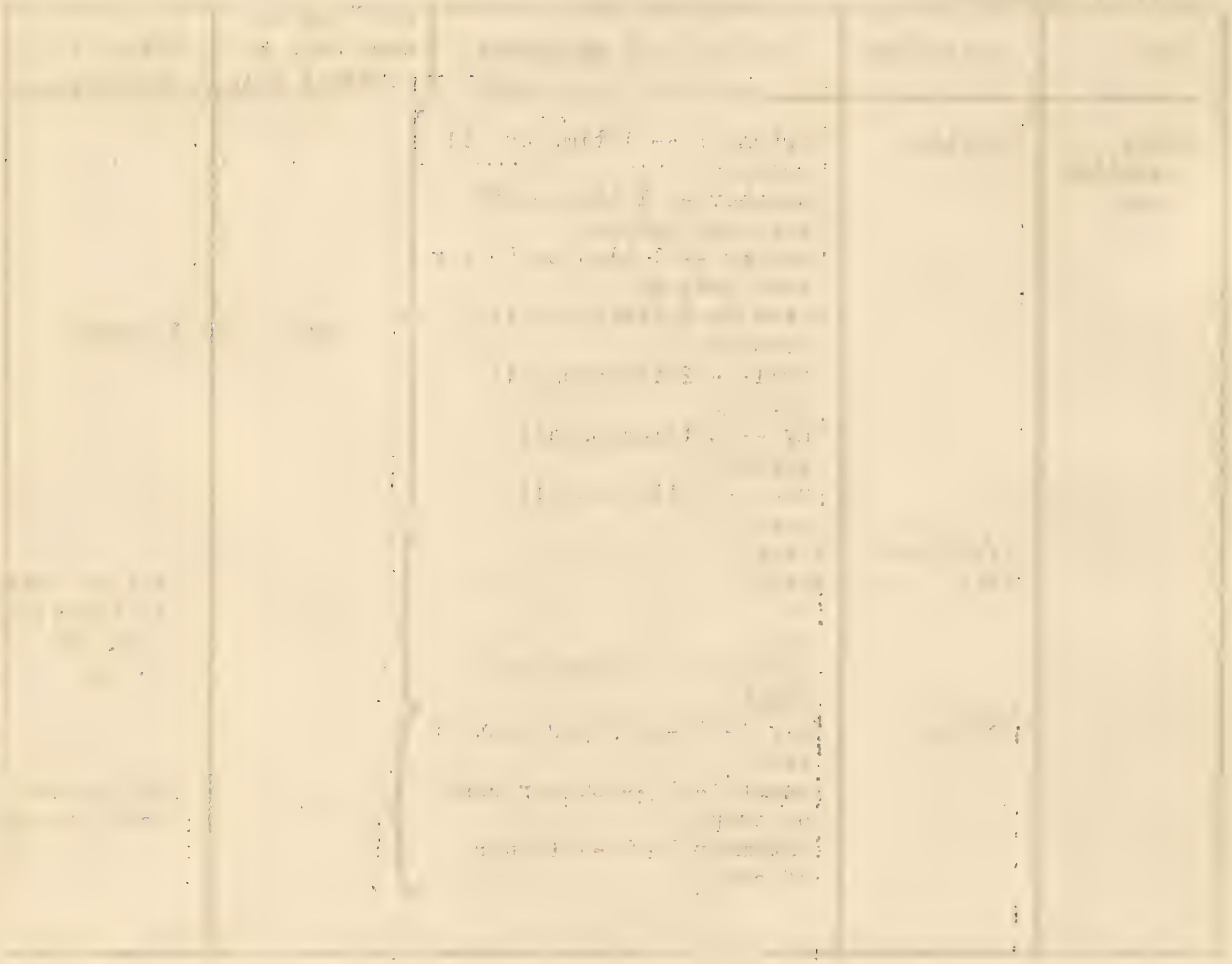


Table 2 continued.

Crop	Operation	Time of need by months	Per cent of work done by seasonal help	Output per man-day
Pears (continued)	Spraying	September -- 1 time on all acreage December -- 1 time on 50 per cent acreage January -- 1 time on 50 per cent acreage March -- 2 times on all acreage April -- 2 times on all acreage May -- 2 times on all acreage June -- 1 time on all acreage	50	2 acres
	Blight control	March April May June about 25 per cent each month	50	average about 20 hours per acre for season
	Picking	July 1-31 -- 60 per cent of crop August 1-31 -- 30 per cent of crop September 1-10 -- 10 per of crop	100	1200 pounds (= 30 boxes)

* Sugar beet hoeing in August is in San Joaquin County, and By-Pass district of Yolo County.

Findings of Seasonal Labor Needs.-- Details and summaries of seasonal labor requirements of agriculture in the delta region are presented as table 3. The "size of task" are figures drawn from table 1, in terms of either acreage or output in tons, crates, boxes, or whatever unit is commonly used. The "output per man-day" is an average figure for the entire acreage or output figured in crates, hampers, boxes, or other units as indicated in the table. If the work is of a nature that requires a crew -- different members of which perform different tasks -- then the average shown is per man based on the entire crew. Length of day is 9 hours, November to February; 10 hours, March to October, unless otherwise stated. Wide variations in output occur between farm and farm, field and field, and season and season, because of differences in soil types, climatic conditions, weeds, yields, and other factors influencing the amount of work that a laborer can perform in a given day. Moreover, the basis of output is a mature, experienced male worker without reference to use of women, children, and more or less inexperienced help that is sometimes used in connection with certain of the tasks requiring use of seasonal workers. The column headed "available days" reflects (a) limitations set from the period within which the work must be performed because of the nature of the task, such as transplanting, thinning, weeding, and cutting, and (b) available days as determined by weather conditions, inclement weather reducing the number of days when a required task can be performed. The "required number of individuals" is given in terms of workers as noted above in connection with "output per man-day."



It is probable that the estimated number of workers required, as recorded in table 3, will often be too low, for the reason that "peaks" frequently occur, during which an unusually large proportion of the job is done in a very short period. This would naturally require a much greater number of workers than when the work is spread over a longer period, even though the total amount of labor (in man-days) remains the same.

TABLE 3

Seasonal Labor Needs -- Delta -- by Months and Tasks

Month	Crop and task	Size of task	Output per man-day	Required man-days	Available days	Required number of workers*
January	Potatoes: Harvesting	186,000 cwt.	40.0 cwt.	4,650	18	259
	Beets (for seed): Planting by hand	1,125 acres	0.75 acre	1,500	18	84
	Carrots (for seed): Transplanting to field	667 acres	0.5 acre	1,334	18	75
	Onions (for seed): Planting	233 acres	0.2 acre	1,165	18	65
	Celery (Fall): Harvesting	90,240 half crates	18.8 half crates	4,800	6	800 (January 1-10)
	Pears: Pruning	1,500 acres	0.25 acre	6,000	18	334
	Spraying	1,125 acres†	2.0 acres	563	18	32
				20,012	18	1,112 man-months ≠
February	Mints: Weeding	63 acres †	0.33 acre	191	20	10
	Onions (intermediate crop): Weeding	1,000 acres	ϕ	1,000	20	50
	Potatoes: Harvesting	93,000 cwt.	40.0 cwt.	2,325	20	117
	Sugar beets: Thinning	730 acres	0.5 acre	1,460	20	73
	Carrots (for seed): Transplanting to field	666 acres	0.5 acre	1,332	20	67
	Onions (for seed): Planting	234 acres	0.2 acre	1,170	20	59
	Peas (market): Hoeing	1,250 acres	₩	875	20	44
	Tomatoes: Transplanting to beds	3,456,000 plants†‖	5,000 plants	692	10	70 (February 15-28)
				9,045	20	453 man-months
March	Mints: Weeding	126 acres †	0.33 acre	382	22	18
	Onions (intermediate crop): Weeding	1,000 acres	ϕ	2,000	22	91
	Onions (late crop): Weeding	2,300 acres	**	4,600	22	210
	Potatoes: Harvesting	93,000 cwt.	40.0 cwt.	2,325	22	106

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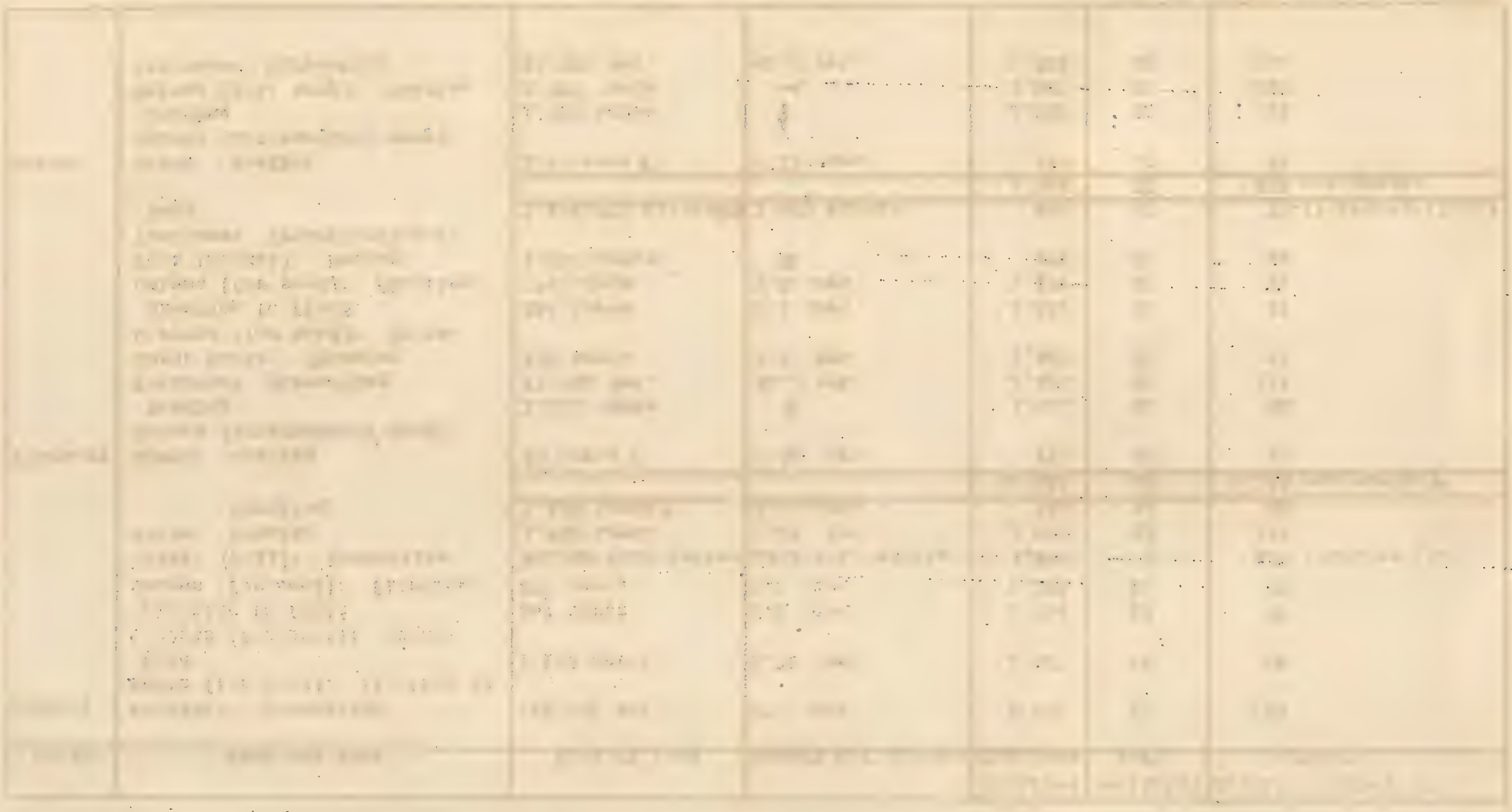

Table 3 continued.

Month	Crop and task	Size of task	Output per man-day	Required man-days	Available days	Required number of workers*
March (continued)	Sugar beets: Thinning	7,304 acres	0.5 acre	14,608	22	664
	Hoeing (first time)	730 acres	1.5 acres	487	22	23
	Beets (for seed): Hoeing	1,500 acres	0.75 acre	2,000	22	91
	Carrots (for seed): Hoeing	800 acres	0.75 acre	1,067	11	97 (March 15-31)
	Lettuce (for seed): Thinning and Hoeing	375 acres	0.5 acre	750	11	69 (March 15-31)
	Onions (for seed): Hoeing	467 acres	0.42 acre	1,112	22	51
	Asparagus: Cutting	60,325 acres	††	187,023	31	6,033
	Peas (market): Hoeing	1,250 acres	¶	875	22	40
	Tomatoes: Transplanting to beds	3,456,000 plants†‖	5,000 plants	692	11	63 (March 1-15)
	Pears: Spraying	4,500 acres†	2.0 acres	2,250	22	103
	Blight control	1,125 acres†	2.0 acres	563	22	26
				220,734	22	10,034 man-months
April	Alfalfa: Mowing with tractor	5,208 acres†	20 acres	261	15	18 (April 10-30)
	Mowing with horses	5,208 acres†	8 acres	651	15	44 (April 10-30)
	Raking with tractor	5,208 acres†	40 acres	131	15	9 (April 10-30)
	Raking with horses	5,208 acres†	20 acres	261	15	18 (April 10-30)
	Shocking	10,417 acres†	40 acres	261	15	18 (April 10-30)
	Trimming	13,750 acres†	10 acres	1,375	15	92 (April 10-30)
	Stacking	3,713 tons†	7.5 tons	496	15	34 (April 10-30)
	Baling	5,625 tons†	3.5 tons	1,608	15	108 (April 10-30)
	Mints: Weeding	252 acres †	0.33 acre	764	22	35
	Onions (intermediate crop): Weeding	1,000 acres	§	2,000	22	91
	Onions (late crop): Weeding	2,300 acres	**	9,200	22	419
	Potatoes: Cutting seed	8,640,000 pounds	1,000.0 pounds	8,640	22	393
	Planting (including fertilizing)	3,600 acres†	1.0 acre	3,600	22	164
	Sugar beets: Thinning	20,815 acres	0.5 acre	41,630	22	1,893
	Hoeing (first time)	7,304 acres	1.5 acres	4,870	22	222

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Table 3 continued.

Month	Crop and task	Size of task	Output per man-day	Required man-days	Available days	Required number of workers*
April (continued)	Sunflowers: Thinning and Hoeing	667 acres	1.0 acres	667	11	61 (April 15-30)
	Beets (for seed): Hoeing	750 acres	1.5 acres	500	11	46 (April 15-30)
	Carrots (for seed): Hoeing	1,600 acres	0.75 acre	2,134	22	97
	Lettuce (for seed): Thinning and Hoeing	750 acres	0.5 acre	1,500	22	69
	Onions (for seed): Hoeing	467 acres	0.42 acre	1,112	22	51
	Asparagus: Hoeing (new crop)	4,014 acres	1.0 acre	4,014	22	183
	Cutting	60,325 acres	††	180,990	30	6,033
	Washing, Trimming and Putting in Lugs	60,325 acres	‡‡	24,140	20	1,207 (April 10-30)
	Celery: Weeding seed bed	1,788 acres	0.33 acre	5,419	11	493 (April 15-30)
	Peas: Picking	28,125 hampers	12.0 hampers	2,344	11	214 (April 15-30)
	Tomatoes: Planting by hand	2,000 acres	0.5 acre	4,000	11	364 (April 15-30)
	Pears: Spraying	4,500 acres†	2.0 acres	2,250	22	103
	Blight control	1,125 acres†	2.0 acres	563	22	26
				305,381	22	13,881 man-months
May	Alfalfa: Mowing with tractor	5,208 acres†	20 acres	261	24	11
	Mowing with horses	5,208 acres†	8 acres	651	24	28
	Raking with tractor	5,208 acres†	40 acres	131	24	6
	Raking with horses	5,208 acres†	20 acres	261	24	11
	Shocking	10,417 acres†	40 acres	261	24	11
	Trimming	13,750 acres†	10 acres	1,375	24	58
	Stacking	8,415 tons†	7.5 tons	1,122	24	47
	Baling	12,750 tons†	3.5 tons	3,643	24	152
	Mints: Weeding	252 acres†	0.33 acre	764	24	32
	Onions (intermediate crop): Weeding	1,000 acres	¢	1,000	24	42
	Onions (late crop): Weeding	2,300 acres	**	9,200	24	384
	Potatoes: Cutting seed	3,600,000 pounds	1,000.0 pounds	3,600	24	150
	Planting (including fertilizing)	1,500 acres†	1.0 acre	1,500	24	63
	Cultivating	9,000 acres	5.0 acres	1,800	24	75
	Hoeing	12,000 acres	0.75 acre	16,000	24	667

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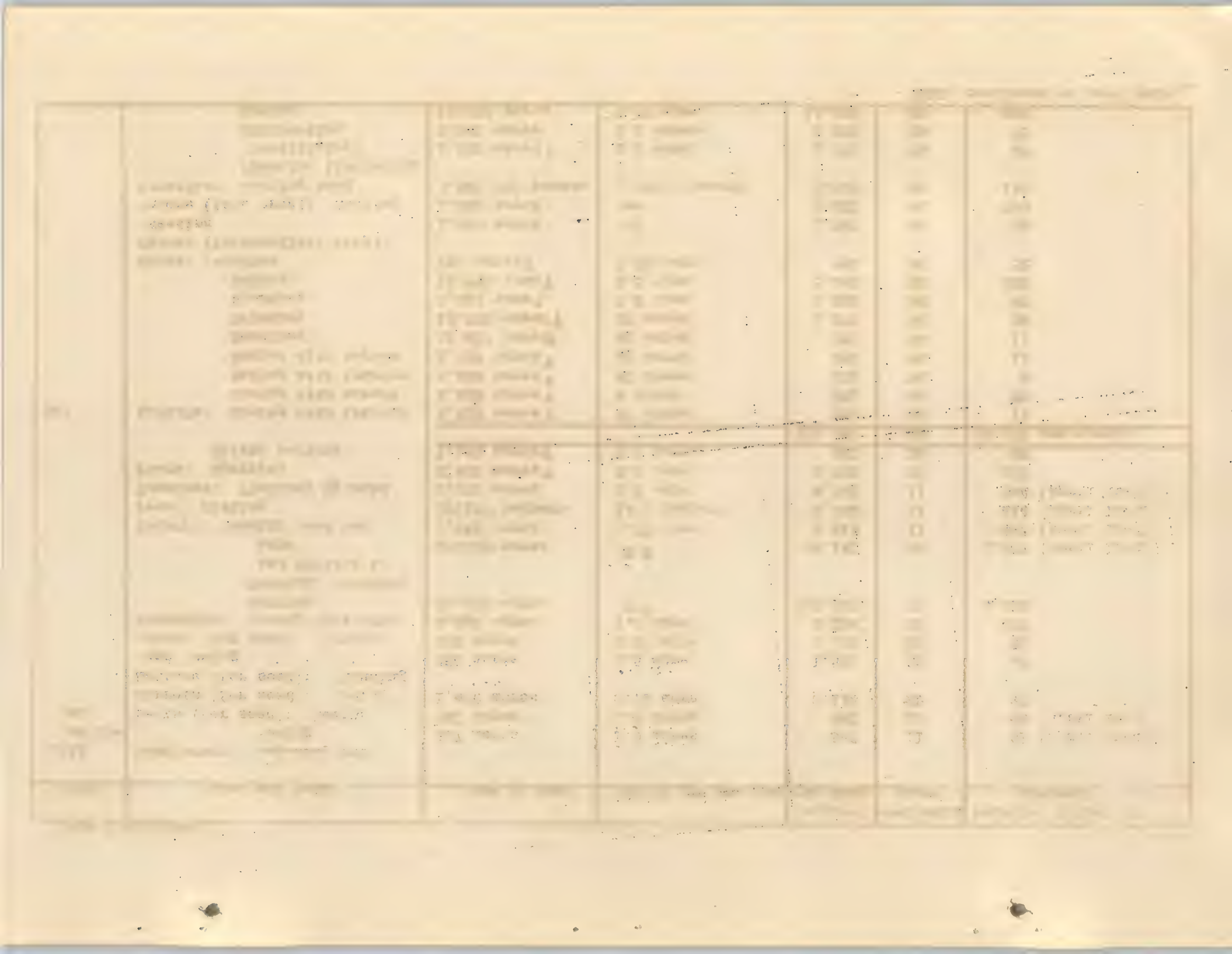

Table 3 continued.

Month	Crop and task	Size of task	Output per man-day	Required man-days	Available days	Required number of workers*
May (continued)	Sugar beets: Thinning	5,843 acres	0.5 acre	11,686	24	487
	Hoeing (first time)	20,815 acres	1.5 acres	13,877	24	579
	(second time)	9,130 acres	2.0 acres	4,565	24	191
	Sunflower: Thinning and Hoeing	1,333 acres	1.0 acre	1,333	24	56
	Beets (for seed): Hoeing	750 acres	1.5 acres	500	12	42 (May 1-15)
	Clipping off top of seed stalks with knife	1,500 acres	5.0 acres	300	24	13
	Carrots (for seed): Hoeing	1,600 acres	0.75 acre	2,134	24	89
	Lettuce (for seed): Thinning and Hoeing	375 acres	0.5 acre	750	12	63 (May 1-15)
	Hoeing	1,000 acres	0.5 acre	2,000	24	84
	Onions (for seed): Hoeing	466 acres	0.42 acre	1,110	24	47
	Asparagus: Hoeing (new crop)	4,014 acres	1.0 acre	4,014	24	168
	Cutting	60,325 acres	††	187,023	31	6,033
	Washing, Trimming and Putting in lugs	60,325 acres	‡‡	37,417	31	1,207
	Celery (Fall): Weeding seed bed	3,575 acres	0.33 acre	10,834	24	452
	Cucumbers: Hoeing	506 acres	§§	506	24	22
	Peas (market): Picking	159,375 hampers	12.0 hampers	13,282	24	554
	Tomatoes: Planting by hand	2,000 acres	0.5 acre	4,000	12	334 (May 1-15)
	Replanting	3,000 acres	5.0 acres	600	24	25
	Hoeing	6,000 acres	1.0 acre	6,000	16	375 (May 10-31)
	Pears: Spraying	4,500 acres†	2.0 acres	2,250	24	94
	Blight control	1,125 acres†	2.0 acres	563	24	24
				346,313	24	14,430 man-months
June	Alfalfa: Mowing with tractor	5,208 acres†	20 acres	261	26	11
	Mowing with horses	5,208 acres†	8 acres	651	26	26
	Raking with tractor	5,208 acres†	40 acres	131	26	6
	Raking with horses	5,208 acres†	20 acres	261	26	11
	Shocking	10,417 acres†	40 acres	261	26	11
	Trimming	13,750 acres†	10 acres	1,375	26	53
	Stacking	8,415 tons†	7.5 tons	1,122	26	44
	Baling	12,750 tons†	3.5 tons	3,643	26	141
	Grain: Harvesting	28,125 acres†	4.0 acres	7,032	26	271

Table continued on next page.

Table 3 continued.

Month	Crop and task	Size of task	Output per man-day	Required man-days	Available days	Required number of workers*	
June (continued)	Grain Sorghums: Hoeing	6,000 acres	1.0 acre	6,000	26	231	
	Mints: Weeding	63 acres †	0.33 acre	191	26	8	
	Onions (intermediate crop): Harvesting	250,000 cwt.	30.0 cwt.	8,334	26	321	
	Potatoes: Cutting seed	1,440,000 pounds	1,000.0 pounds	1,440	26	56	
	Planting (including fertilizing)	600 acres †	1.0 acre	600	26	24	
	Cultivating	12,000 acres	5.0 acres	2,400	26	93	
	Hoeing	12,000 acres	0.75 acre	16,000	26	616	
	Sugar beets: Thinning	1,826 acres	0.5 acre	3,652	26	141	
	Hoeing (first time)	5,843 acres	1.5 acres	3,896	26	150	
	(second time)	25,562 acres	2.0 acres	12,781	26	492	
	(third time)	9,130 acres	2.5 acres	3,652	26	141	
	Lettuce (for seed): Hoeing	500 acres	0.5 acre	1,000	13	77	(June 1-15)
	Asparagus: Cutting	60,325 acres	††	180,990	30	6,033	
	Washing, trimming, and putting in lugs	60,325 acres	‡‡	36,210	30	1,207	
	Celery (Fall): Weeding seed bed	1,787 acres	0.33 acre	5,416	13	417	(June 1-15)
	Pulling plants	2,145 acres	0.25 acres	8,580	13	660	(June 15-30)
	Planting (by machine)	2,145 acres	0.5 acre	4,290	13	330	(June 15-30)
	Cucumbers: Hoeing	506 acres	§§	506	26	20	
	Tomatoes: Replanting	3,000 acres	5.0 acres	600	26	24	
	Hoeing	6,000 acres	1.0 acre	6,000	26	231	
	Pears: Spraying	2,250 acres †	2.0 acres	1,125	26	44	
	Blight control	1,125 acres †	2.0 acres	563	26	22	
				318,963	26	12,268	man-months
July	Alfalfa: Mowing with tractor	5,208 acres †	20 acres	261	26	11	
	Mowing with horses	5,208 acres †	8 acres	651	26	26	
	Raking with tractor	5,208 acres †	40 acres	131	26	6	
	Raking with horses	5,208 acres †	20 acres	261	26	11	
	Shocking	10,417 acres †	40 acres	261	26	11	
	Trimming	13,750 acres †	10 acres	1,375	26	53	
	Stacking	8,415 tons †	7.5 tons	1,122	26	44	
	Baling	12,750 tons †	3.5 tons	3,643	26	141	
	Grain: Harvesting	28,125 acres †	4.0 acres	7,032	26	271	

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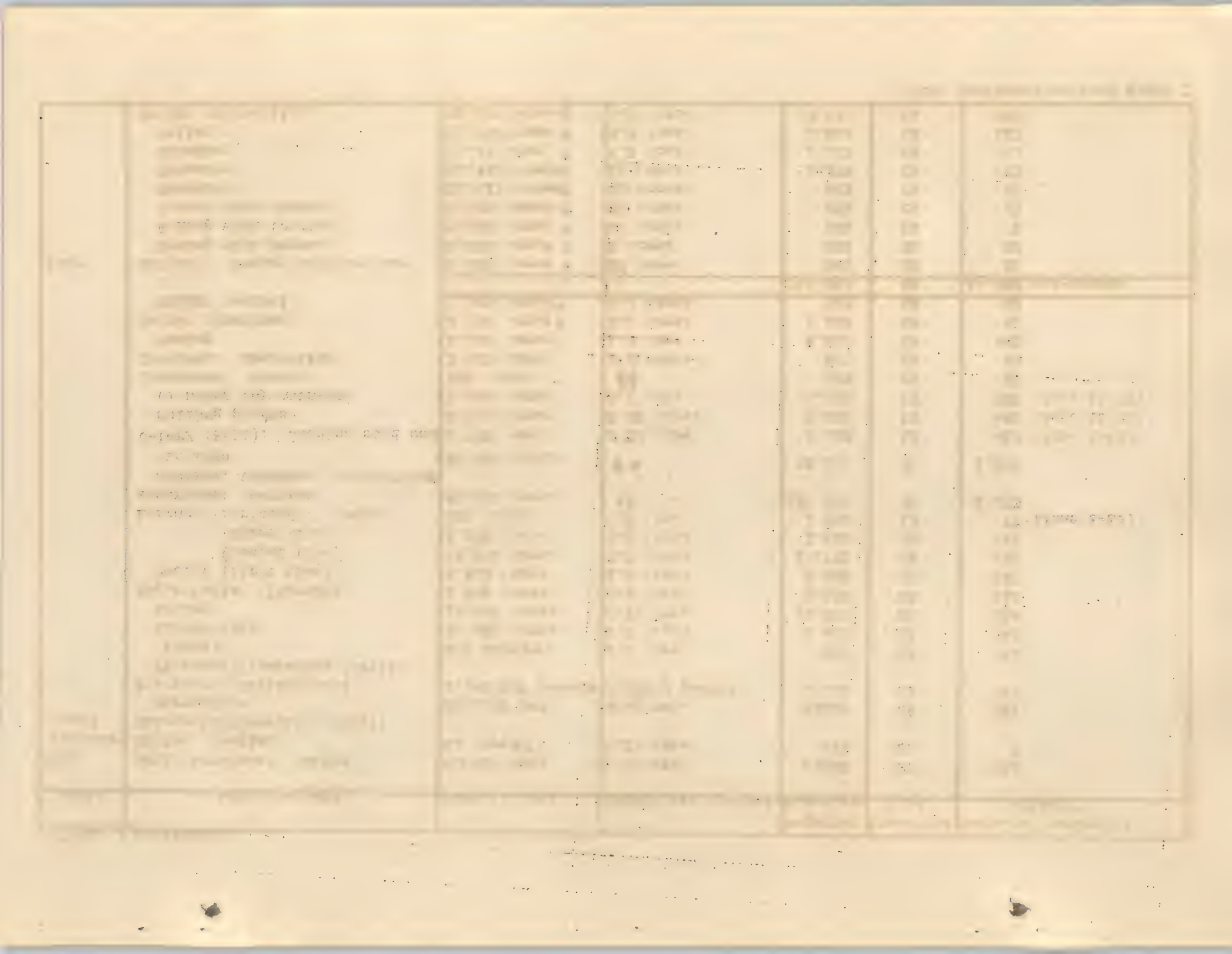

Table 3 continued.

Month	Crop and task	Size of task	Output per man-day	Required man-days	Available days	Required number of workers*
July (continued)	Onions: Harvest (pulling, topping, and sacking)	60,375 cwt.	30.0 cwt.	2,013	9	224 (July 20-31)
	Potatoes: Cultivating	12,000 acres	5.0 acres	2,400	26	93
	Harvesting	55,800 cwt.	40.0 cwt.	1,395	26	54
	Sugar beets: Hoeing					
	(first time)	1,826 acres	1.5 acres	1,218	26	47
	(second time)	1,826 acres	2.0 acres	913	26	36
	(third time)	18,258 acres	2.5 acres	7,304	26	281
	Topping and loading	74,496 tons	6.0 tons	12,416	26	478
	Lettuce (for seed): Cutting and throwing on wagons	150 acres	0.33 acre	455	26	18
	Onions (for seed): Picking (hand cutting)	466 acres	0.17 acre	275	9	31 (July 20-31)
	Asparagus: Hoeing (new crop)	4,014 acres	1.5 acres	2,676	26	103
	Celery (Fall): Pulling plants	4,290 acres	0.25 acre	17,160	26	660
	Planting (by machine)	4,290 acres	0.5 acre	8,580	26	330
	"Scratching" (weeding)	7,150 acres	0.4 acre	17,875	13	1,375 (July 15-31)
	Cultivating	7,150 acres†	6.0 acres	1,192	13	92 (July 15-31)
	Cucumbers: Picking	506 acres	¶¶	4,048	16	253 (July 15-31)
	Pears: Picking	13,500 tons	1,200.0 pounds	22,500	26	866
				117,157	26	4,507 man-months
August	Alfalfa: Mowing with tractor	5,208 acres†	20 acres	261	26	11
	Mowing with horses	5,208 acres†	8 acres	651	26	26
	Raking with tractor	5,208 acres†	40 acres	131	26	6
	Raking with horses	5,208 acres†	20 acres	261	26	11
	Shocking	10,417 acres†	40 acres	261	26	11
	Trimming	13,750 acres†	10 acres	1,375	26	53
	Stacking	8,415 tons †	7.5 tons	1,122	26	44
	Baling	12,750 tons†	3.5 tons	3,643	26	141
	Beans: Hoeing (first time)	16,000 acres	1.0 acre	16,000	17	942 (August 1-20)
	(second time)	16,000 acres	2.0 acres	8,000	9	889 (August 20-31)
	Onions (late crop): Harvest (pulling, topping, and sacking)	241,500 cwt.	30.0 cwt.	8,050	26	310

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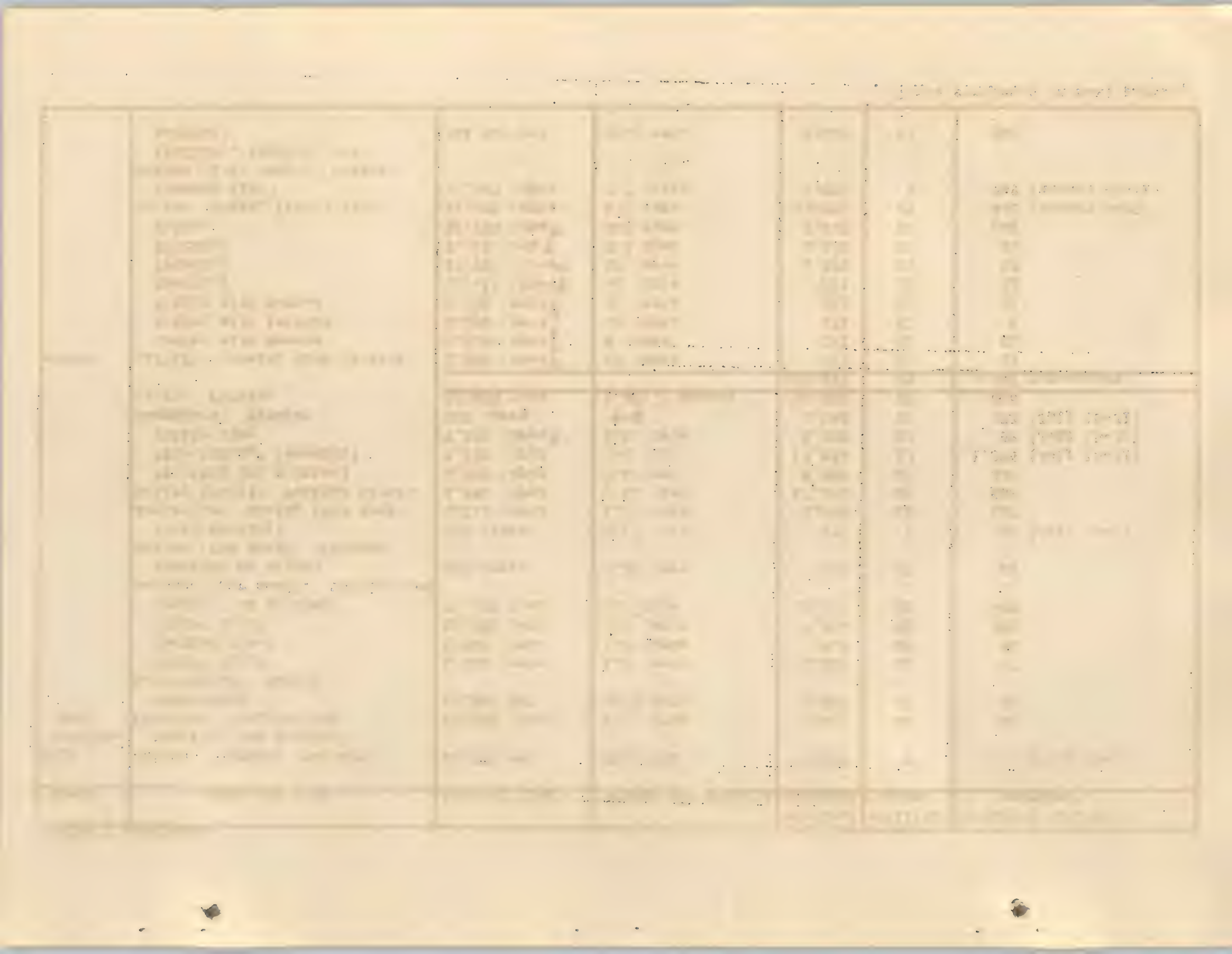

Table 3 continued.

Month	Crop and task	Size of task	Output per man-day	Required man-days	Available days	Required number of workers*
August (continued)	Potatoes: Cultivating	9,000 acres	5.0 acres	1,800	26	70
	Harvesting	353,400 cwt.	40.0 cwt.	8,835	26	340
	Sugar beets: Hoeing (third time)	9,130 acres	2.5 acres	3,652	26	141
	Topping and loading	173,824 tons	6.0 tons	28,971	26	1,115
	Sunflowers: Cutting off heads by hand	400 acres	1.5 acres	267	13	21 (August 15-31)
	Beets (for seed): Cutting off branches and drying in piles	1,500 acres	0.5 acre	3,000	26	116
	Threshing from stock	960 acres †	1.8 acres	534	13	42 (August 15-31)
	Carrots (for seed): Harvest (cutting by hand and piling)	1,000 acres	0.4 acre	2,500	9	278 (August 20-31)
	Lettuce (for seed): Cutting and throwing on wagons	1,200 acres	0.33 acre	3,637	26	140
	Threshing, screening, and sacking	600 acres †	0.5 acre	1,200	26	47
	Onions (for seed): Picking (hand cutting)	234 acres	0.17 acre	1,377	4	345 (August 1-5)
	Threshing, screening, and winnowing	350 acres †	0.4 acre	875	26	34
	Asparagus: Hoeing (new crop)	4,014 acres	1.5 acres	2,676	26	103
	Cutting					
	Celery (Fall): Pulling plants	715 acres	0.25 acre	2,860	4	715 (August 1-5)
	Planting (by machine)	715 acres	0.5 acre	1,430	4	358 (August 1-5)
	"Scratching" (weeding)	7,150 acres	0.4 acre	17,875	26	688
	Cultivating	14,300 acres †	6.0 acres	2,384	26	92
	Cucumbers: Picking	506 acres	¶¶	7,843	31	253
	Tomatoes: Picking	4,500 tons	0.75 ton	6,000	13	462 (August 15-31)
	Pears: Picking	6,750 tons	1,200.0 pounds	11,250	26	433
				148,721	26	5,721 man-months
September	Alfalfa: Mowing with tractor	5,208 acres †	20 acres	261	25	11
	Mowing with horses	5,208 acres †	8 acres	651	25	27
	Raking with tractor	5,208 acres †	40 acres	131	25	6
	Raking with horses	5,208 acres †	20 acres	261	25	11

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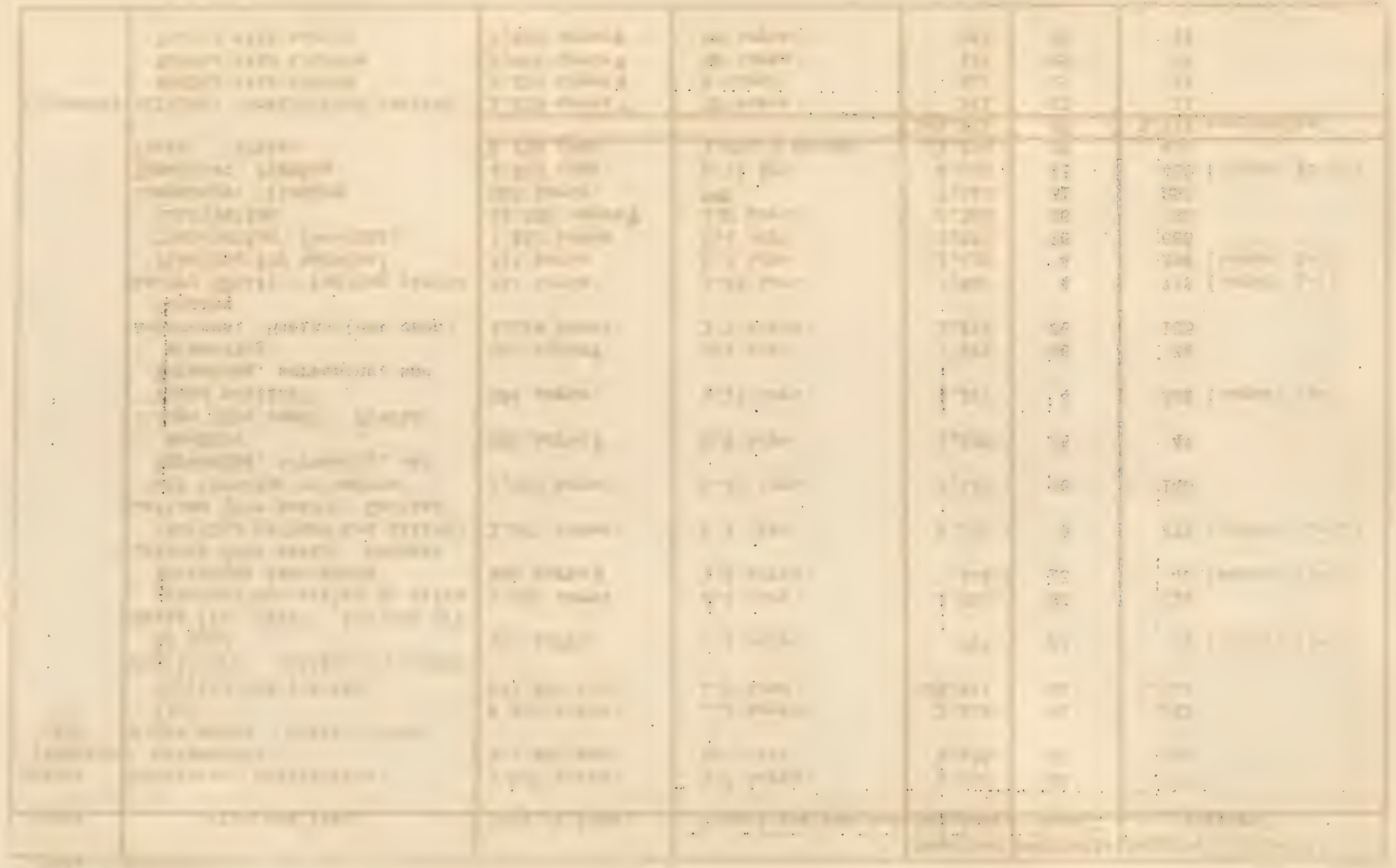

Table 3 continued.

Month	Crop and task	Size of task	Output per man-day	Required men-days	Available days	Required number of workers*	
September (continued)	Alfalfa (continued)						
	Shocking	10,417 acres†	40 acres	261	25	11	
	Trimming	13,750 acres†	10 acres	1,375	25	55	
	Stacking	8,415 tons†	7.5 tons	1,122	25	45	
	Baling	12,750 tons†	3.5 tons	3,643	25	146	
	Beans: Piling, windrowing	4,000 acres	1.66 acres	2,410	8	302	(September 20-30)
	Potatoes: Cultivating	6,000 acres	5.0 acres	1,200	25	48	
	Harvesting	279,000 cwt.	40.0 cwt.	6,975	25	279	
	Sugar beets: Topping and loading	167,616 tons	6.0 tons	27,936	25	1,118	
	Sunflowers: Cutting off heads by hand	800 acres	1.5 acres	534	25	22	
	Beets (for seed): Threshing from piles	240 acres†	1.8 acres	134	6	23	(September 1-7)
	Carrots (for seed): Harvest (cutting by hand and piling)	1,000 acres	0.4 acre	2,500	17	148	(September 1-20)
	Threshing, screening and sacking	1,000 acres†	0.33 acre	3,031	25	122	
	Lettuce (for seed): Cutting and throwing on wagons	150 acres	0.33 acre	455	25	19	
	Threshing, screening and sacking	150 acres†	0.5 acre	300	25	12	
	Celery (Fall): "Scratching" (weeding)	7,150 acres	1.0 acre	7,150	25	286	
	Cultivating	14,300 acres†	6.0 acres	2,384	25	96	
	Cucumbers: Picking	506 acres	¶¶	3,795	15	253	(September 1-15)
	Tomatoes: Picking	13,500 tons	0.75 ton	18,000	25	720	
	Pears: Spraying	2,250 acres†	2.0 acres	1,125	25	45	
	Picking	2,250 tons	1,200.0 pounds	3,750	8	469	(September 1-10)
	Onions (late crop): Harvest (cutting, topping, and sacking)	100,625 cwt.	30.0 cwt.	3,355	13	259	(September 1-15)
				92,739	25	3,710	man-months

Table continued on next page.

Table 3 continued.

Month	Crop and task	Size of task	Output per man-day	Required man-days	Available days	Required number of workers*
October	Alfalfa: Stacking	3,713 tons†	7.5 tons	496	8	62 (October 1-10)
	Baling	5,625 tons†	3.5 tons	1,608	12	134 (October 1-15)
	Beans: Piling, windrowing	12,000 acres	1.66 acres	7,229	24	302
	Threshing	6,400 acres†	4.0 acres	1,600	24	67
	Corn: Picking, husking, and hauling to cribs	9,000 acres	0.75 acre	12,000	24	500
	Grain Sorghums: Harvesting (with combine)	3,000 acres†	2.5 acres	1,200	24	50
	Potatoes: Harvesting	316,200 cwt.	40.0 cwt.	7,905	24	330
	Sugar beets: Topping and loading	136,576 tons	6.0 tons	22,763	24	949
	Sunflowers: Cutting off heads by hand	800 acres	1.5 acres	534	24	23
	Celery (Fall): "Scratching" (weeding)	7,150 acres	1.0 acre	7,150	12	596 (October 1-15)
	Cultivating	7,150 acres†	6.0 acres	1,192	12	100 (October 1-15)
	Harvesting	56,400 half crates	18.8 half crates	3,000	12	250 (October 15-31)
	Tomatoes: Picking	12,000 tons	0.75 ton	16,000	24	667
				82,677	24	3,445 man-months
November	Corn: Picking, husking, and hauling to cribs	12,000 acres	0.75 acre	16,000	23	696
	Onions (intermediate crop): Transplanting	500 acres	one-eighth acre	4,000	23	174
	Potatoes: Harvesting	279,000 cwt.	40.0 cwt.	6,975	23	304
	Sugar beets: Topping and loading	37,248 tons	6.0 tons	6,208	23	270
	Celery (Fall): Harvesting	451,200 half crates	18.8 half crates	24,000	23	1,044
	Pears: Pruning	1,500 acres	0.25 acre	6,000	23	261
				63,183	23	2,748 man-months
December	Corn: Picking, husking, and hauling to cribs	9,000 acres	0.75 acre	12,000	18	667
	Onions (intermediate crop): Transplanting	500 acres	one-eighth acre	4,000	18	223

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Table 3 continued.

Month	Crop and task	Size of task	Output per man-day	Required man-days	Available days	Required number of workers*
December (continued)	Potatoes: Harvesting	204,600 cwt.	40.0 cwt.	5,115	18	285
	Sugar beets: Topping and loading	31,040 tons	6.0 tons	5,174	18	288
	Beets (for seed): Planting by hand	375 acres	0.75 acre	500	9	56 (December 15-31)
	Carrots (for seed): Transplanting to field	667 acres	0.5 acre	1,334	18	75
	Onions (for seed): Planting	233 acres	0.2 acre	1,165	18	65
	Celery (Fall): Harvesting	451,200 half crates	18.8 half crates	24,000	18	1,334
	Pears: Pruning	1,500 acres	0.25 acre	6,000	18	334
	Spraying	1,125 acres†	2.0 acres	563	18	32
				59,851	18	3,326 man-months

* On a monthly basis unless otherwise noted.

† Estimated portion of job done by seasonal workers.

‡ It should be noted that this figure, rather than representing the total number of individuals required, represents the number of man-months of labor required, and is derived by dividing the total number of man-days by the number of days available for work during the month.

ϕ It is estimated that 6 man-days are required to weed an acre of onions (intermediate crop) for one season. They are weeded from two to four times -- 1 man-day per acre being required in February and May, and 2 man-days per acre in March and April.

Ħ Hoeing peas requires about 14 man-hours per acre -- one-half in February and one-half in March.

‖ 20 per cent added to allow for replanting needs.

** It is estimated that 10 man-days are required to weed an acre of onions (late crop) for one season -- 2 man-days per acre in March, and 4 man-days per acre in April and May.

†† Asparagus cutting requires one man continuously on each 10 acres.

‡‡ Washing, trimming, and putting asparagus in lugs for cannery requires one man to each 50 acres.

§§ It is estimated that a total of 20 man-hours per acre is required for hoeing cucumbers three times -- one-half of which is required in May, and one-half in June.

¶¶ Cucumber picking requires one man continuously for each 2 acres.

TABLE 4

Summary of Seasonal Labor Needs by Months
Sacramento and San Joaquin Deltas
1935

Month	Required man-days of seasonal labor	Available work days	Required man-months of seasonal labor
January	20,012	18	1,112
February	9,045	20	453
March	220,734	22	10,034
April	305,381	22	13,881
May	346,313	24	14,430
June	318,963	26	12,268
July	117,157	26	4,507
August	148,721	26	5,721
September	92,739	25	3,710
October	82,677	24	3,445
November	63,183	23	2,748
December	59,851	18	3,326
Total	1,781,580	--	75,495

Notes

Notes on Table 2.-- Data concerning "time of need" as shown in this table break down required seasonal labor into the period in which the work is performed in order to permit a subsequent determination of labor needs by months (table 3). Some operations are performed only to a limited extent with seasonal labor. For instance, only about 75 per cent of the labor in harvesting grain is done by seasonal workers. When a job extends over several different months, the proportionate amount for each month is shown.

The amount of work done each month is based on the cropping system followed during 1935. The allotting of amounts of work is based on findings concerning local farm practices, and required time to "make" a crop resulting from inquiry of producers, and records of carlot shipments, the latter proving helpful in fixing dates of planting and of subsequent tasks involved in producing certain crops. Proportionate amounts of output harvested each month were determined from data of local practices with respect to harvesting, and from carlot shipments of perishable products. Records of truck shipments were also used when available.

Notes on Table 3.-- Table 3 is the condensed summary of labor needs as worked out for "the Delta" as a result of findings pertinent to 1935. The data are presented by months with the tasks which were performed in each month indicated by both crop and task. The size of the job was calculated from the data appearing in table 1 (acreage and production) and table 2 (task, time of performance, and percentage of work pertinent to a given month). The output per man-day was calculated as indicated in the foreword presenting table 3. The number of required man-days is a result of dividing the size of task by output per man-day. The available days for the different tasks involve two variables. The first is the number of days when field work is possible because of favorable weather conditions.

The basis for this column was determined from a study of the monthly weather charts of the United States Weather Bureau for the years 1933, 1934, and 1935. These data indicated available days per month as follows (based on a 26-day working month without allowance for holidays):

Month	Available days	Length of work day	Month	Available days	Length of work day
		hours			hours
January	18	9	July	26	10
February	20	9	August	26	10
March	22	10	September	25	10
April	22	10	October	24	10
May	24	10	November	23	9
June	26	10	December	18	9

Source of data: Based upon precipitation records of the Stockton and Sacramento stations of the United States Weather Bureau for the years 1933, 1934, and 1935.

The second factor influencing the number of available days was the size of the job. If the output was only a few cars, then the number of days was limited to the time needed to get out those cars efficiently. If a field operation had to be performed in a period less than the number of available days in the month, then the specific number of days was noted. These restrictions are shown in parentheses. For example, in October the harvesting of celery was limited to the last half of the month.

The totals of table 3 show the total required man-days of needed seasonal labor, the available days for field work during the month, and the necessary number of men (as defined in the opening paragraph of table 3) required on a monthly basis to care for the tasks ordinarily performed by seasonal workers.

In an area such as the Delta, involving a variety of annual crops, the findings as set forth in this report are bound to fluctuate materially from year to year, because of the market outlook upon what and how much acreage is planted, and when it is planted; because of variable seasonal conditions affecting yields, time of performing operations, and available days; and because of harvesting operations on certain crops being speeded up to supply a good market, or retarded to avoid a poor one, resulting in marked variations in the need for harvest labor.